INTERMOUNTAIN STATION
Central Reference file
No. 0.73
RECEIVED
NOV 11 1942
RESEARCH
INTERMOUNTAIN

Research Note

NORTHERN ROCKY MOUNTAIN
FOREST AND RANGE EXPERIMENT STATION

Note No. 27 November 1942 Missoula, Montana

BETTER PRODUCTION FROM SHORTGRASS RANGES THROUGH CONSERVATIVE SHEEP GRAZING

By
E. J. Woolfolk

Native range and other grazing lands provide about 75 percent of the total feed requirements for the sheep and cattle populations in Montana. The average for the 11 western range states is about the same. It has been estimated that for sheep alone in Montana about 15 percent of the total feed requirement comes from harvested feeds and that the remainder, or about 85 percent, is provided by native ranges and pastures. The stability of the range sheep industry is thus closely linked with the welfare of the native range which is the foundation of profitable range sheep production.

FLUCTUATIONS IN SHEEP NUMBERS

Range livestock numbers vary widely in response to weather, markets, feed supplies, and other factors. For example, in Montana, livestock numbers reached a peak in 1934, at which time ranges were generally overstocked, then declined to 1938 and increased again to the present. Sheep numbers alone, reached nearly 4.1 million in Montana in January 1934. This number was 29 percent above the average for the 20-year period ending in 1940. The inevitable reductions in stocking on the overcrowded ranges were hastened by severe drought in 1934 and again in 1936. By January 1938 numbers were down to about 2.7 million stock sheep. This reduction demonstrated that Montana's feed resources were inadequate during drought years for 4.1 million sheep in addition to the other livestock of the State. Even without drought, reductions from the 1934 peak doubtless would have been necessary. With the condition of ranges now equal to or perhaps above the predrought level, the Extension Service recently reported an approximate balance between Montana's feed resources and present livestock numbers which are below the 1934 inventory. The Agricultural Marketing Administration reported about 3.8 million stock sheep in Montana in January 1942, an increase of about 40 percent, or more than a million head in the four years since 1938.

Undoubtedly, there are yet some individual ranches with a safe margin of range and supplemental feed on which some increase in sheep numbers is justified. The wisdom of any material increase in total range sheep numbers in Montana, however, may well be questioned. In the first place, further increases in breeding herds would withhold lambs and other young sheep that would otherwise go to market to fill increased wartime demands. Also, experience has demonstrated that severe drought occurs in the Northern Great Plains of Montana on the average of once in 5 to 7 years to reduce the forage crop to a fraction of normal. During such years, the risk of heavy losses or forced liquidation, usually at low prices, is increased when ranges are stocked too heavily. Furthermore, it has been demonstrated in native

INT FILE COPY

range pastures at the United States Range Livestock Experiment Station near Miles City, Montana, that a conservative rate of stocking is preferable to heavy grazing by sheep because the latter results in rapid deterioration of the shortgrass range and reduced sheep gains.

THE EXPERIMENT

Since 1936 a sheep range experiment has been conducted by the Forest Service in cooperation with the Bureau of Animal Industry and the Montana Agricultural Experiment Station to determine the effects of stocking shortgrass ranges at different intensities. Equal numbers of yearling Rambouillet ewes were run in three pastures of varied size to determine the effects of grazing on the range and on the sheep. The three grazing or stocking intensities were arbitrarily designated as heavy, moderate, and light.

The grazing season usually extended over a period of about eight months - from late March to late November - but in 1936, which was the first year of the test, it embraced only 4½ months, extending from mid-June to late October. A total of 35 yearling ewes grazed each of the three pastures in 1936 and again in 1937. Numbers were increased to 42 in each pasture in 1938, to 55 in 1939, to 80 in 1940, and to 104 in 1941. These various increases were made in an effort to maintain heavy, moderate, and light grazing intensities as originally planned, because it became evident that the quantity of forage produced and the density of the cover increased with successive favorable seasons from the low level reached at the close of the drought.

CONSERVATIVE GRAZING INCREASED GAINS OF EWES AND ALLOWED RAPID RECOVERY OF RANGE FORAGE

The yearling ewes gained 1.3 and 2.25 pounds more on the average per season, over the last 5-year period, on moderate and lightly stocked range, respectively, than on heavily grazed range. Even these small differences are of financial significance, because on a band of 1,000 ewes they represent 1,300 to 2,250 pounds of gain, which at 8 cents per pound amounts to a premium of $104 to $180 for conservative stocking. Even though yearling ewes are seldom sold by the pound, size and condition are major factors in the sale value of such ewes. However, this increased body gain and value of the ewes from the moderate and lightly grazed pastures are minor items compared to the better condition of the range on these two than on the heavily grazed pasture after five years.

The density and amount of forage produced on all pastures tended to increase quite rapidly during the four favorable seasons after 1937. On quadrats established in 1938 on ungrazed sheep range, the density had increased 61 percent by early 1941. Moderate and lightly grazed quadrats showed similar increases, but improvement was reduced on heavily grazed plots despite the favorable weather conditions which prevailed from 1938 to 1941. Utilization surveys, which were made on all pastures near the close of each season, showed that a considerable amount of unused forage remained on the largest pasture each year. On the smaller pasture, however, very little forage was left and severe damage to the range was the cumulative effect on the more heavily grazed portions.

One example of the benefits accruing from conservative stocking after a severe drought was the increase in size and number of grass clumps on the moderate and lightly grazed areas. Grama grass clumps averaged 42 percent larger and niggerwool clumps 37 percent larger, respectively, on the undamaged range than on the heavily grazed range in 1941. These significant differences show something of the rapidity and extent to which drought-stricken northern shortgrass ranges will improve with favorable weather under conservative stocking.

A very marked difference in the numbers of small annual plants, which have little or no grazing value, was evident between the heavily grazed pasture and areas more lightly grazed. One series of small plots on heavily grazed range supported an average of 521 annuals and 55 square centimeters of perennial grasses, while a similar series of plots on a more lightly grazed area averaged 256 annuals and 96 square centimeters of valuable perennial grasses. The contrast in appearance of the range due to such varied grazing is shown by figures 1 and 2. (page 4)

A special survey was made late in 1941 in an effort to determine the extent to which the range in all three pastures had been retarded in improvement or damaged by heavy grazing. Some damage by heavy grazing was found on parts of even the pasture that was intended to be lightly grazed, but the damage was more striking and widespread on the smallest pasture. Because the sheep were not herded on any of the pastures, they grazed and trampled certain favored spots to the point where cumulative heavy damage was evident. In the most heavily grazed pasture, 70 percent of the total area was damaged, but damage to a lesser degree was found on only 42 and 21 percent, respectively, of the area of the two pastures next larger in size. After evaluating the total cumulative damage based on degree and size of each of these areas, this survey indicated that light and moderate grazing resulted in 2.8 and 18.7 percent damage to the range, respectively, while heavy grazing had produced 35.5 percent damage to the 332-acre pasture. It was concluded from this and the yearly utilization surveys that little or no damage would have resulted in the largest pasture, which was lightly stocked, had grazing been uniformly distributed. The smallest pasture of 332 surface acres was damaged so severely by heavy stocking that it was evident that the pasture was too small for the degree of grazing practiced. Satisfactory gains of the ewes and an approximate balance between surplus forage and damage indicate that stocking of the medium-sized moderately grazed pasture of 476 surface acres was more nearly correct than in either of the other pastures.

Because of the strong upward trend in forage density and amount during the four favorable years following the drought period, the acreage per ewe varied as stocking was increased in all pastures. Thus, it is difficult to define specifically the minimum acreage of this range per yearling ewe that is essential for best results. The largest pasture was stocked too lightly and the smallest too heavily, but the most economical and satisfactory balance between sheep gains and forage use was obtained with moderate stocking on the 476-acre pasture intermediate in size. The average was 1.1 acres per yearling ewe-month during the last 5-year period. This average figure is not a satisfactory stocking guide, even for this experimental range under more normal conditions when forage density and production are at a much higher level than prevailed on the average through 1937 to 1941.

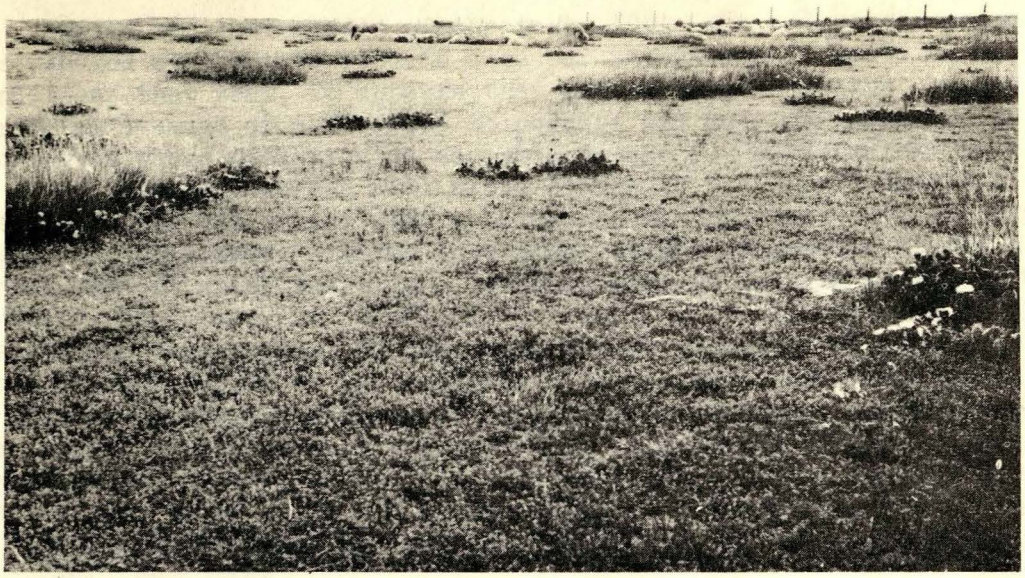

Photo No. 415227

Figure 1.--After six years of heavy grazing by yearling ewes, annuals, mainly woolly Indian wheat, replaced more valuable grasses. Remnants of these grasses are visible in the protection of the pricklypear.

Photo No. 415238

Figure 2.--After six years of light grazing, blue grama, niggerwool, little bluegrass, and other valuable forage species are abundant and vigorous while cactus and annuals of little value are held in check.

During the last season of the test, 1941, the moderately grazed pasture was stocked at the rate of 0.56 acre per sheep-month. Based on forage conditions that year, it appears that for an 8-month season, beginning in March, an average of about 0.56 to perhaps 0.6 acre per month of such shortgrass range will provide adequate forage for satisfactory development of a dry yearling ewe and will avoid damage to the range, provided the total area is grazed uniformly. The application of this tentative stocking figure is, of course, limited to similar ranges comparable to the experimental area of which there is a large acreage in eastern Montana. Unfortunately, sheep were not available in 1942 for further testing of this preliminary conclusion. If the range forage continues to improve above the level of 1941, or above the predrought level, this acreage estimate may be revised downward accordingly. Regardless of whether 0.56 acre represents exactly the proper acreage allowance per sheep-month on the moderately grazed pasture, it is clear that this provides a better balance between satisfactory sheep gains and welfare of such a range than either the heavy or light rates of stocking used in this test.

CONCLUSIONS

Results of this experiment demonstrate the tremendous fluctuation in forage production due to (1) drought followed by favorable seasons, and (2) different intensities of grazing by sheep. Also, that conservative grazing increases sheep gains, reduces damage to the range, and accelerates recovery after a severe drought. It is clearly evident that the handicap of drought must be minimized by avoiding too heavy grazing before range livestock operations can be placed on a stable basis. Even during favorable years, heavy grazing by sheep at the rate practiced on the smallest pasture resulted in cumulative and severe range deterioration, while conservatively grazed areas recovered rapidly.

The present need for increased marketing to meet wartime production goals, coupled with prevailing high prices, provides most favorable conditions for the sale of surplus sheep where ranges are now so heavily stocked as to cause damage and to reduce weight gains. It should be remembered that a severe drought has occurred in the Northern Great Plains at irregular intervals but on an average of 5 to 7 years since records were begun in 1878. No one can foretell when the next drought may strike. When it does, heavy liquidation - possibly at very low prices - will be necessary on ranges that are stocked too heavily. Those whose ranges are stocked conservatively will be able to make necessary adjustments with less sacrifice and the range will recover more rapidly than where too heavy stocking has been the rule. It will be unfortunate, indeed, if ranges are stocked so heavily that meat and wool production is reduced and range production impaired by one-third, as was the case under heavy grazing in this experiment.

# # # # #